

Probability and
Statistics

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Sec - A

5th Semester

Mid-exam

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Question No-01

The following are the scores made by three batsmen A, B and C in a series of innings.

A	12	15	6	73	7	19	199	36	84	65
B	3	13	43	102	175	226	204	139	69	36
C	5	14	36	105	99	20	15 20	96	13	45

- Ⓐ who is better as a run getter?
 Ⓑ who is more consistent player?
 Ⓒ which one player is more varied.
 Ⓓ find Empirical relation for player A.



Sol:- from given data;

Batsman 'A'		Batsman B		Batsman C	
Score x_i	x_i^2	Score x_i	x_i^2	Score x_i	x_i^2
12	144	3	9	5	25
15	225	13	169	14	196
6	36	43	1849	36	1296
73	5329	102	10404	105	11025
7	49	175	30625	99	9801
19	361	220	48400	20	400
199	39601	204	41616	20	400
36	1296	139	19321	15	225
84	7056	69	4761	13	169
65	4225	30	900	45	2025
<u>$\sum x_i = 516$</u>	<u>$\sum x_i^2 = 54522$</u>	<u>$\sum x_i = 1058$</u>	<u>$\sum x_i^2 = 168921$</u>	<u>$\sum x_i = 448$</u>	<u>$\sum x_i^2 = 34378$</u>

(a) Which player is better run getter?

A;

$$\text{Mean Score} = \bar{x} = \frac{\sum x_i}{n} = \frac{516}{10} = 51.6$$

$$\bar{x} = 51.6$$

B;

$$\text{Mean Score} = \bar{x} = \frac{\sum x_i}{n} = \frac{1058}{10} = 105.8$$

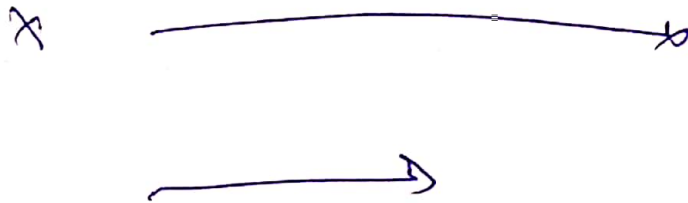
$$\bar{x} = 105.8$$

C;

$$\text{Mean Score} = \bar{x} = \frac{\sum x_i}{n} = \frac{448}{10} = 44.8$$

$$\bar{x} = 44.8$$

As the average score of B is greater than batsman A and C, so B is better run getter.



Who is more consistent player?

Coefficient of variation = C.V = $\frac{S_x}{\bar{x}} \times 100$

for P S

for Batsman A_i

$$S_x = \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$$

$$= \sqrt{\frac{54522}{10} - \left(\frac{516}{10}\right)^2}$$

$$= \sqrt{5452.2 - (51.6)^2}$$

$$S_x = 52.21$$

$$C.V = \frac{S_x}{\bar{x}} \times 100 = \frac{52.81}{51.6} \times 100$$

C.V = 102.34%



f₀

for batsman B:

$$S_x = \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$$

$$= \sqrt{\frac{168924}{10} - \left(\frac{1058}{10}\right)^2}$$

$$= \sqrt{16892.4 - (105.8)^2}$$

$$S_x = 75.49$$

$$C.V = \frac{S_x}{\bar{x}} \times 100 = \frac{75.49}{105.8} \times 100$$

$$C.V = 71.351\%$$

for Bat



for batsman C_i

⑥

$$S_n = \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$$

$$= \sqrt{\frac{34378}{10} - \left(\frac{448}{10}\right)^2}$$

$$= \sqrt{3437.8 - (44.8)^2}$$

$$S_n = 37.82$$

$$C.V = \frac{S_n}{\bar{x}} \times 100$$

$$= \frac{37.82}{44.8} \times 100$$

$$\Rightarrow C.V = 84.49\%$$



(B) which player is more varied?
 as Co-efficient of variation (C.V)
 for batsman B is smaller than
 batsman A and C, so batsman B
 is more variable.

(C) ~~who is the~~
 which one player is more
 variable.

as Co-efficient of variation for
 batsman A is greater than
 that for batsmen B and C,
 so batsman A is more variat.

Q) Empirical relation for player A?

Player A Score

12

15

6

73

7

19

199

36

65

$$\text{Mean} = \bar{x} = \frac{\sum x_i}{n} = \frac{252}{10} = 25.2$$

$$\text{mode} = \frac{n+10}{2} = 5^{\text{th}} \text{ 1}$$

$$\text{Median} = \frac{n}{2} = \frac{10}{2} = 5^{\text{th}}$$

mod. Empirical relation

$$\text{mode} = 3 \text{ median} - 2 \text{ mean}$$

$$5 = 3(5) - 2(25.2)$$

$$\uparrow = -35.4$$

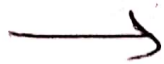
Question No. 02

The following is the distribution of wages per thousand employees in a certain factory.

Classes	2-4	6-8	10-12	14-16	18-20	22-24	26-28
frequency	3	13	6	10	5	3	5

Calculate mean, Median and mode?

Discuss Symmetrical and Skewness characteristics.



Sol:-

class	class-boundaries	F	x	f.x	c.f
2-4	3-5	3	3	9	3
6-8	5-9	13	7	91	16
10-12	9-13	6	11	66	22
14-16	13-17	10	15	150	32
18-20	17-21	5	19	95	37
22-24	21-25	3	23	69	40
26-28	25-29	5	27	135	45
30-32	29-33	3	31	93	48
34-36	33-37	2	35	70	50
		$\sum f = 50$		$\sum fx = 778$	

$$\text{mean} = \bar{x} = \frac{\sum fx}{f} = \frac{778}{50}$$

$$\Rightarrow \boxed{\bar{x} = 15.56}$$

mode = ?

$$\text{mode} = \frac{n}{2}^{\text{th}} \quad (\text{even})$$

$$\text{mode} = 25^{\text{th}}$$

20 C.F. it is present in class
14-16.

So, as we know;

$$\text{mode} = l + \frac{f_m - f_0}{2f_m - f_0 - f_1} \times h$$

$$h = 4; f_m = 32, l = 13$$

$$f_0 = 6, f_1 = 5$$

$$\text{mode} = 13 + \frac{10 - 6}{20 - 6 - 5} \times 4$$

$$\Rightarrow \boxed{\text{mode} = 14.77}$$

median = ?

$$\text{median} = \frac{n^{\text{th}}}{2} \quad (\text{even})$$

$$= \frac{50}{2} = 25^{\text{th}}$$

in table c.f matched to that of class 14-16

as we know;

$$\text{median} = l + \frac{h}{f} \left(\frac{n}{2} - c.f \right)$$

$$l = 13, h = 4, f = 10, c.f = 32$$

$$\text{median} = 13 + \frac{4}{10} \left(\frac{50}{2} - 32 \right)$$

→ median = 10.2

Symmetrical and Skewness characteristics :-

[Faint, illegible handwritten text follows, likely describing the characteristics of symmetrical and skewed distributions.]

Q No. 03

Discuss merits and demerits of median and geometric mean?

Ans

Advantages of median:-

- ① It can be easily calculated.
- ② It is not affected by extreme values.
- ③ It can be calculated even there is frequency distribution.

Disadvantages:-

- ① It is not regularly defined
- ② It is not capable of lending itself to further statistical treatment.

Advantages of Geometric Mean:-

- ① defined by a mathematical formula.
- ② It is not much affected by simplifying variability.
- ③ It is based on ^{all} observed values.

Disadvantages:-

- ① not easy to calculate.
- ② In case of negative values, it can not be completed at all.

→

THE END.